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**TRANSCRIPT OF RECORD**

(Pages 2097 to 2154)

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**Supreme Court of the United States**

**OCTOBER TERM, 1951**

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**No. 428**

**PENNSYLVANIA WATER AND POWER COMPANY  
AND SUSQUEHANNA TRANSMISSION COMPANY  
OF MARYLAND, PETITIONERS,**

*vs.*

**FEDERAL POWER COMMISSION ET AL.**

**No. 429**


**PENNSYLVANIA PUBLIC UTILITY COMMISSION,  
PETITIONER,**

*vs.*

**FEDERAL POWER COMMISSION**

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**ON WRITS OF CERTIORARI TO THE UNITED STATES COURT OF  
APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT**



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**PETITIONS FOR CERTIORARI FILED NOVEMBER 16, 1951**

**CERTIORARI GRANTED FEBRUARY 4, 1952**

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[17956]

GEORGE W. SPAULDING.

CROSS-EXAMINATION.

By MR. WAHRENBRÖCK:

[17976] Q. Will you explain the method you used in arriving at the conclusion that 35 per cent of the total backfeed—that at least 35 per cent of the total backfeed in 1946 was used in connection with the requirements of the Pennsylvania Railroad?

[17978] THE WITNESS: For any hour in which there was a net amount of energy received at Safe Harbor over the 220 kv circuits from Baltimore to Washington, I first presumed that a portion of that energy was received for the purpose of supplying interchange or used in connection with interchange arranged by Penn Water with its Pennsylvania customers, involving additional generation by Baltimore Company in order to do so, and therefore it was proper and is proper to recognize that the first use of that backfeed was for such interchange because had there not been interchange there would have been less energy received.

The second step was then to determine how much of the remainder was converted by the frequency changer at Safe Harbor from three-phase sixty cycle to single phase, twenty-five cycles.

By MR. WAHRENBRÖCK:

Q. Can you explain how you did that? A. Yes, I did that in two ways.

In order to determine the maximum amount of such backfeed used in connection with railroad services, I assumed that all remaining backfeed after adjustment for interchange transactions was so converted, and using that method of determination on an hourly basis, I found that about 43 per cent of the [17979] backfeed was used in con-



nection with single phase and railroad supply to the Pennsylvania Railroad.

Then in order to get any possible limitations or other assumptions someone else might prefer, I used a second assumption and arrived at a second answer of 35 per cent of the backfeed used in connection with railroad services, by assuming that none of the backfeed remaining after accounting for interchange transactions was available for conversion until all of the sixty cycle generation at Safe Harbor, plus all the infeed at Safe Harbor from the 66 kv circuits from Holtwood Company was first used for conversion and then the remainder, if any, was assumed to come from the backfeed from Baltimore as indicated by the notes on my work sheet.

Q. Let me ask you a question now, first about your first assumption, which as I understand it was that the flow of energy from Maryland onto the Safe Harbor bus is a flow of energy which is first used for the supply of interchange energy delivered by Penn Water to the Pennsylvania customers, is that correct? [17980] A. That is generally correct, yes.

Q. That assumption is an assumption not that the energy received from Baltimore is actually the energy which is delivered by Penn Water to the Pennsylvania customers at the points of deliveries, but that as a matter of economics of the operation of the business you treat it that way, is that correct? A. No, I do not think I would agree with you and I think I stated before the reason for treating it in that manner.

The economics of system operation determine the amount of interchange transactions, namely the amount delivered by Penn Water and Safe Harbor to its Pennsylvania customers as interchange. Whenever such transaction is arranged for, it generally means that Baltimore will increase its generation or that Washington would have to increase their generation.

That, at times may result in backfeed from Maryland to Pennsylvania over the 230 kv circuits. When it does result in such backfeed I know as an operating man that the only reason there is backfeed is in order to supply energy for use in connection with these interchange transactions.

I am not interested in the slightest where that energy goes in a tracing manner. I am interested in the purpose for which it does come back from Maryland to Pennsylvania.

Therefore, in everything that we do today, and everything [17981] we have done for years Baltimore Company and Penn Water have always recognized that that backfeed is first used in connection with interchange transactions.

It was only natural then that in preparing this worksheet and this figure that I would use exactly that same procedure.

I cannot answer the question of where it went as a matter of physical fact and I am not interested, I am only interested in the purpose for which this backfeed was received.

TRIAL EXAMINER: Now, let us not repeat unnecessarily.

By MR. WAHRENBROCK:

Q. The same explanation applies to your second presumption, does it not, your second assumption? A. Which one?

Q. That is, that none of the remaining backfeed is available for supply of the railroad until all of the 60 cycle Safe Harbor generation and all of the infeed at Safe Harbor from the 66 kv circuits from Holtwood has first been used for the supply of the railroad's requirements? A. In that connection, I do not agree with that assumption; but I was afraid that someone else might want to use it and I wanted to show the extreme possibilities, on any possible assumption that one might use, what percentage figure one

could get and that is the reason I used the second presumption, not that I agree with it in any respect.

[17982] Q. The second assumption, whether you agree or disagree with it, is likewise one which is not based upon the actual tracing of the energy? A. Absolutely, that is correct. It is not based on any tracing of energy.

[17984] Q. Are there hours when there is a receipt of what you refer to as backfeed on the Safe Harbor bus and no delivery of interchange energy to the Pennsylvania customers? A. There may be.

Q. During such hours is the receipt of backfeed determined by the interchange requirements? A. Obviously, if there were no interchange requirements the amount received would not be related to the interchange requirements, if I understood your question.

Q. Then the answer is yes? A. My answer stands as it was.

Q. Can you answer it yes or no?

[17985] THE WITNESS: No.

By MR. WAHRENBROCK:

Q. Is it determined by the firm power requirements?

[17986] THE WITNESS: It may or may not be, not necessarily, no.

Q. You have said it may or may not be, I want to know under what circumstances it would and under what circumstances it would not.

TRIAL EXAMINER: That is going too far afield. Obviously the circumstances mean nothing in this hearing unless they relate to the exhibit you are now using as the basis of your cross-examination.

[17987] Q. Mr. Spaulding, why during an hour when there was no interchange requirement and backfeed was received

from Maryland and there was a firm power requirement, did you not assume that the backfeed went to the supply of that firm power requirement before going to the supply of the railroad requirement? A. Because Baltimore Company has an operating responsibility relating to the supply of the Pennsylvania Railroad's firm requirements. That is very obvious from all of my testimony.

[17988] Q. Why did that firm obligation—why did you assume that firm obligation was of such a nature that the energy went first to it over the supply of energy to the other firm obligations? A. Because in one case Baltimore Company has an operating responsibility and in the other case it has none, and when I say it has an operating responsibility of course I am talking about the supply to the Pennsylvania Railroad, and when I say it has none I am referring to the Pennsylvania customers of Penn Water and Safe Harbor, including Met. Edison, Pennsylvania Power and Light, and Philadelphia Electric.

[17995] Q. I will now reframe the question and put this question to the witness: When you say that the Baltimore Company has an operating responsibility for the supply of the firm power requirements of the Pennsylvania Railroad is that operating responsibility an operating responsibility for the supply of energy which is transmitted from Maryland? A. At times, and I am assuming when you talk of "the supply of energy which is transmitted from Maryland", you are not referring to the supply of energy to the railroad, but rather the supply of energy to Penn Water and Safe Harbor who have the facilities for furnishing electric services to the railroad.

I have to make that assumption in connection with my answer, Mr. Wahrenbrock.

Q. All right. Now, you say at times, what are those times? A. At such times as Penn Water and Safe Harbor do not have sufficient energy themselves to supply the requirements of the Pennsylvania Railroad—and I am speaking of all the requirements of Pennsylvania Railroad,



under Exhibit 10—while operating their facilities—and I am referring to their generating facilities—for maximum utilization of the natural resources.

. . . . .

[18002] TRIAL EXAMINER: Mr. Witness, in addition to the interchange requirements should the firm power requirements under some circumstances come ahead?

THE WITNESS: No.

TRIAL EXAMINER: Why not?

[18003] THE WITNESS: Because Baltimore Company has no operating responsibility at any time for the firm power requirements in Pennsylvania. They do have an operating responsibility for at least a portion of the Pennsylvania Railroad requirements and the interchange is not a requirement at all but is a transaction to carry out the most economical operation.

. . . . .

[18005] Q. I ask that you direct your attention, if you will, please, to transcript 16601 of your rebuttal testimony, and particularly to line 18 of that page, and I ask if you will, please, that you state what you meant in that answer by the term "net Baltimore backfeed"? A. It is the amount of kilowatt-hours determined from the sum of the net hourly readings measuring the amount of backfeed received by Penn Water and transmitted to Safe Harbor.

Q. Is that limited to the amounts received over the 220 kv circuits? A. Right.

Q. And by backfeed, you mean energy transmitted from Maryland to Safe Harbor, is that right? A. That is correct.

Q. Now, in the same line and in the next line, will you explain what in that answer you mean by the phrase "In connection with electric services supplied to Penn Water's or Penn Water's and Safe Harbor's firm power customers in Pennsylvania (excluding the Pennsylvania Railroad)"? A. The net kilowatt-hours received by Penn Water and Safe Harbor, used in connection with all electric services

[18006] supplied to the Pennsylvania customers, including energy, capacity and so on.

Q. When you say "used in connection with", do you mean that that energy supplied in whole or in part energy requirements of those customers? A. I do not know. The energy was received at Safe Harbor at the time that energy was being delivered to these Pennsylvania customers to meet their requirements.

Q. The figures which you show in your Exhibit 357 are not clear to us, Mr. Spaulding, and I would like to have you refer to your Exhibit 357, and take the kilowatt-hours in column 1 and explain how you computed it for any one year, if you will, please? A. Supposing that you use one hour as an example, and of course, I do not have the exact hourly figures to use, but I would use a hypothetical hour for purposes of illustration.

I again, as in our discussion this morning, considered that any of the backfeed received at Safe Harbor was the amount actually metered because of the interchange transactions that may have been arranged for in that hour, and therefore I reduced my net backfeed by that amount.

Secondly, I further considered that the second use of backfeed was for the supply of the Pennsylvania Railroad loads.

However, in this instance, in contrast with Exhibit 354 I assumed that any amounts so received and delivered to the [18007] Pennsylvania Railroad, any amount so received in connection with the delivery of services to the Pennsylvania Railroad for service in Maryland was a delivery from Safe Harbor to Baltimore Co. I was therefore only concerned with the amounts supplied to Pa. Railroad in Pennsylvania in connection with the computation of this figure.

TRIAL EXAMINER: What figures are you referring to, Exhibit 357?

THE WITNESS: Yes.

TRIAL EXAMINER: What column?

THE WITNESS: Column 1.

By MR. WAHRENBROCK:

Q. How did you determine the amount of that portion to which you last referred of the deliveries to the Pennsylvania Railroad which were used in Maryland? A. For the hypothetical hour, I knew the requirements of the Pennsylvania Railroad in Maryland. I knew the amounts delivered to the Pennsylvania Railroad facilities at Benning. The balance was the amount delivered to the Pennsylvania Railroad in Maryland.

Q. Did you have to take into account the amounts delivered or interchanged at Perryville and which originated from the Philadelphia Electric Company at Chester? A. Not for this purpose, no.

Q. Well, if there were during any of these hours receipts [18008] at Perryville from the facilities of the railroad of energy originating in Philadelphia Electric at Chester, how was that measured and determined that it was not included in these amounts? A. May I use a second example to show that? May we assume that there were 20,000 kwh received at Safe Harbor over the 220,000 volt facilities from Baltimore and that there were during the same period or hour delivered to Pennsylvania R. R. from whatever source it may have been delivered a total of 30,000 kilowatt-hours used by the railroad in Maryland; that 5,000 of those kilowatt-hours were supplied from Benning.

The net amount supplied to the railroad in Maryland was 25,000 kilowatt-hours delivered to the railroad at Perryville for use in Maryland.

Q. And delivered at Conowingo, also, or in part? A. That is correct; Conowingo and Perryville for use in Maryland.

I was not concerned with who made the delivery. For that hour, then, we have 20,000 kilowatt-hours received at Safe Harbor from Baltimore and 25,000 delivered to the railroad for use in Maryland.

I then had for that hour no backfeed at all used for any other purpose because there was more delivery to the

railroad in Maryland than there was received from Baltimore.

Q. Now, to test the question that I was seeking the [18009] answer to, may I just change one figure for you and ask you what you did under those circumstances? A. You may.

Q. Instead of 20,000 kilowatt hours received at Safe Harbor over the 220 circuit from Baltimore, assume during that hour there were 25,000 kilowatt hours? A. There would still be no use of backfeed for Pennsylvania customers as is shown in column 1 of Exhibit 357.

Q. Now, that is the way you did make your calculation, on that theory illustrated by that hypothetical hour? A. That is correct.

Q. Now, what I want to inquire is how in so making your allocations of energy you took into account, or whether you in fact did not take into account that during that hour part of the 25,000 delivered to the railroad at Conowingo and at Perryville may have been energy which, as you explained earlier in your cross-examination, was supplied to the railroad facilities at Chester by the Philadelphia Electric Co. and being in excess of the requirements of the railroad between that point and Perryville were treated as delivered to Penn Water, and by it to the Pennsylvania Railroad for use beyond Perryville.

[18010] THE WITNESS: I did not concern myself with whether or not a portion of the 25,000 kwh delivered to the railroad for use in Maryland at Conowingo and Perryville came from Chester, or whether it came from Safe Harbor for the purpose of these figures on Exhibit 357.

By MR. WAHNBROCK:

Q. A portion may have come from that source during those hours? A. That is correct.

Q. And as much as 25,000 might come from that source during any one of those hours? A. Perhaps.



Q. That is 25,000 megawatt hours or kilowatt hours?

A. Kilowatt hours in one hour and I doubt that there would be that much.

Q. Now, with this same hour in mind that we have last been talking about, that is the illustration you gave with the 25,000 kilowatt hours received at Safe Harbor over the 220 circuits from Baltimore, the other figures remaining as you gave them, assume, if you will, that the meters show a flow from the 60 cycle Safe Harbor bus to the 25 cycle Safe [18011] Harbor bus of only 10,000 kilowatt hours.

Under such conditions, did you make any adjustment in the manner of treatment which you have previously explained?

. . . . .

THE WITNESS: I did not concern myself with the operation of the frequency changer at Safe Harbor in connection with the determination of the amounts shown on Exhibit 357.

By MR. WAHRENBROCK:

Q. And I understand that to mean that if the meters on the circuit between the 60 cycle bus and the 25 cycle bus recorded less than 25,000 kilowatt hours in the direction [18012] of the 25 cycle bus during this hypothetical hour, that made no difference in your treatment of the allocation of energy during that hour.

. . . . .

THE WITNESS: My statement was that I gave no consideration to the operation of the frequency changer or the amount of energy converted through the frequency changer in either direction.

By MR. WAHRENBROCK:

Q. We are not clear, in spite of your previous answer, that you have started in this allocation with the net hourly energy receipts over the 220 kv circuits, that you may not in your answer have overlooked transactions over 66 kv. 25 cycle line from Holtwood to Highlandtown, and I want

to ask you if you will state specifically whether the starting figure which you used in this computation on Exhibit 357 was the receipts over the 220 kv circuits without any deduction for any amount which might have been flowing in the other direction during the same hour over the 25 cycle circuit? A. I did net the flow on the 25 and 60 cycles as a starting figure, but that was not your first question. Your first question was how does the energy become transmitted as shown on that exhibit and that energy is transmitted from Safe Harbor over the 220 kv circuits.

[18013] Q. Were there substantial amounts transmitted from Holtwood to Highlandtown during the hours which you considered in calculating the figures in the first column on Exhibit 357? A. I do not understand your question. First, what do you mean by "substantial amounts"?

Q. Substantial in relation to the amount of backfeed over the 220 kv circuits?

THE WITNESS: I do not know how to answer that question specifically. Of course I did consider all hours in the year in order to arrive at the figures shown, but in all hours there was not backfeed over the 220 kv lines.

In certain hours of the year there were substantial amounts flowing from Holtwood to Highlandtown in Baltimore, as the record clearly shows.

I still do not know whether I have answered your question.

By MR. WAHRENBROCK:

Q. Well, maybe we can approach it if you can tell us what the figures for any one of the years in column 1 on Exhibit 357 would have been if you had not deducted from the receipts over the 220 kv the flow toward Highlandtown over [18014] the 132 kv circuits from Holtwood to Highlandtown?

THE WITNESS: I do not believe I can.

By MR. WAHRENBROCK:

Q. Were there hours in which the flow toward Highlandtown over the 132 kv circuits exceeded the amount of flow—you are shaking your head; I do not understand.

A. There is something wrong with your question already. You talk about the 132 kv lines at Highlandtown. Of course, there are no 132 kv lines at Highlandtown.

Q. I see. The line from Holtwood to Highlandtown is a 66 kv line? A. Yes.

Q. All right. Were there hours when the amount of the net flow to Highlandtown from Holtwood over the 66 kv circuit exceeded the amount of the flow from Baltimore to Safe Harbor over the 220 kv circuits? A. Most of the time.

Q. Now, during an hour in which the flow toward Highlandtown over the 66 kv circuit exceeded the amount of the flow towards Safe Harbor over the 220 circuit, did you use a negative figure in computing the total which went into the first column on Exhibit 357? A. No, I did not. [18015] There is nothing in that hour. I would use zero in that hour.

Q. You would use zero in that hour? A. Right.

Q. I wish you would look at Exhibit 369, if you will, please, and tell me whether the figures in the first column on that exhibit are computed by netting the flows on the 66 kv circuit from Holtwood to Highlandtown against the flows on the 220 kv circuit from Baltimore to Safe Harbor?

A. That is correct, and in order that you may understand, I wish to state again that in each instance after netting the flows in those two circuits, I also gave consideration to the amount of energy delivered to the railroad at Perryville for use in Maryland, so that those three factors must be taken into consideration in each hour in connection with the amounts shown in column 1 of Exhibit 354.

Q. Is the same thing true of Exhibit 369, the first figure, the figures in the first column? A. That is correct.

Q. Now, your reference to your deduction of the deliveries to the railroad makes it seem to me material to inquire whether the flows over the line from the Conestoga bus at Safe Harbor to Perryville are predominantly in that direction or in the reverse direction? A. I think—I was not concerned with that.

[18016] Q. But do you know? A. The flow was predominantly from Conestoga substation to Perryville over circuits P-7 and P-8, and predominantly from Perryville to Conestoga on circuits P-5 and P-6.

Q. In your deduction of the amounts supplied to the railroad, to which you previously referred, did you take net amounts over those four circuits? A. No, I computed it exactly, as I stated sometime back, by taking the difference between the requirements of the railroad in Maryland and the amounts received by the Railroad from the Benning frequency changer.

Q. And the actual metered flows on the circuits from the Conestoga bus to Perryville did not influence your determination? A. The amount of energy flowing on any of the groups of circuits was not used by me in arriving at the figure used in the determination of the amounts shown on Exhibit 357.

Q. Well, then, will you explain what the basis is for the figures you used as representing the railroad's requirements for its own purposes in Maryland?

. . .

THE WITNESS: I will have to give consideration to the meters at Perryville on the so-called bypass that we discussed yesterday, the meter readings on P-7 and P-8 circuits at [18017] Safe Harbor, the meter readings at Fishing Creek and the meter readings at Benning.

Q. And your figures which are reflected in the first column of Exhibit 357 are based upon the totals for each of those three years of figures so computed from such meter readings?

. . .



THE WITNESS: I am sorry. I do not understand the question.

By MR. WAHRENBROCK:

Q. Well, you say you gave consideration to the meters on the bypass, on circuits 7 and 8, at Safe Harbor, at Fishing Creek and at Benning? A. Oh, those were for the purpose of determining the requirements of the railroad in Maryland for its own use.

Q. Now, do I understand you mean that you took the yearly totals of those meter readings and computed the yearly requirements for each of these three years of the railroad in Maryland from those meter readings?

MR. MYSE: For what purpose?

THE WITNESS: Certainly not for the purpose of Exhibit 357. I considered them hourly along with the other things we have been discussing in the last 15 or 20 minutes. I took no annual figures.

[18018] Everything was on an hourly basis.

By MR. WAHRENBROCK:

Q. But you took those hourly figures that you have just referred to for these meters on the bypass, on circuits 7 and 8, Fishing Creek, and Benning which entered into your hourly calculations which you made for every hour for each of these three years? A. No, but I had to have that amount being the railroad's requirement in Maryland for each hour of each of three years as one of the components that I considered in connection with the figures shown on 357; but I did not use the figure for every hour. It is not a matter of plus or minus. I had to set it up in order to determine this figure but I only used it for relatively few hours.

Q. That is to say you made a sampling study? A. No, I had to do it every hour but only in certain hours of the year were there amounts that I reflected in Exhibit 357, as the title would indicate.

For instance, there were only certain hours in the year when there was a net backfeed from Baltimore for any purpose. There are two purposes: one was the net backfeed that is used for railroad purposes, such as we discussed this morning in connection with Exhibit 354.

Then there were also amounts of net Baltimore backfeed used in connection, et cetera, which are computed for the [18019] purpose of Exhibit 357.

Q. Now, for every hour in which there was a net backfeed, that is a net of the flow on 66 kv circuits and on the 220 kv circuits, did you in reaching the figures in the first column of Exhibit 357 actually compute the railroad's Maryland requirements by using the meter readings on these four sets of meters that you referred to, the bypass, circuits 7 and 8, Fishing Creek and Benning? A. I think that is generally a correct statement, yes. The only reason I do not want to say yes, is because I had determined that amount as well as the amount of such energy supplied from Benning before I could determine whether there was a net Baltimore backfeed for the purpose of Exhibit 357.

Q. Yes, I assumed that.

Did the deductions which you made in connection with computation of the figures in the first column of Exhibit 357 for supply of the railroad's requirements for its own use in Maryland have the effect of reducing the amount for most hours which went into the total in the first column on Exhibit 357? A. I think that would be the mathematical effect, yes; not in every hour, but I think the net effect for the year would be as you intimate.

Q. Do you recall whether the actual net hourly delivery to Safe Harbor over the 220 kv circuits, without deduction for the flows in the opposite direction during those hours over [18020] the 66 kv circuits to Highlandtown for 1946, was in the neighborhood of 155 million kilowatt hours?

•   •   •

**THE WITNESS:** Yes. It was actually 157,809,000 kilowatt-hours.

**TRIAL EXAMINER:** Did you have that on an exhibit?

**THE WITNESS:** It is the figure in the lower right-hand corner of Exhibit 354, being the bottom figure in the last column to the right after adjusting or after deducting the amount of actual net hourly backfeed over the 25 cycle circuit from Highlandtown to Holtwood in an amount of 1,673,000 kilowatt-hours.

**TRIAL EXAMINER:** Where did you get the 1,673,000?

**THE WITNESS:** That is shown on one of my work sheets, entitled, "Net Hourly Megawatts Received by P. W. P. from Baltimore Company".

**TRIAL EXAMINER:** It is not in an exhibit?

**THE WITNESS:** No, I do not think it is.

. . .

[18021] By MR. WAHRENBROCK:

Q. Inasmuch as that work sheet to which you referred in answer to the Examiner is not in the record, can you give us for the years 1944 and 1945 the corresponding figures to the one which you gave the Examiner of 157,809,000 for the year 1946? A. The corresponding figure for the year 1945 is the amount shown for the year 1945 in Exhibit 354 the last column to the right after adjustment or after deducting the sum of the net hourly readings of the backfeed from Highlandtown to Holtwood of 60,000 Kwh. I do not have the figures for 1944 with me.

Q. May I understand your last answer for 1945? The figure would be 50,216 megawatt-hours less 60 megawatt-hours, is that correct? A. Yes, sir.

Q. Or 50,156 megawatt-hours? A. Yes.

Q. For 1945 and that figure for 1945 differs from the figure which you show for 1945 in the first column of Exhibit 369 by reason of the fact that that figure of 50,000

hours represents flows to Safe Harbor over the 220 kv circuits without deduction for flows from Holtwood to Highlandtown over the 66 kv circuits; is that correct? A. Yes.

[18022] Q. And the figure of 157,809 megawatt-hours which you give us for 1946 differs in the same way from the figure of 99,439 megawatt-hours in the first column on Exhibit 369 for the year 1946? A. It does differ because in Exhibit 369 I have netted the flows on the two circuits in order to determine the annual backfeed energy supply for the purpose of Exhibit 369.

Q. Directing your attention again, if you will, please, to your Exhibit 354 and particularly to the last column of figures on that exhibit, will you tell me first whether that includes energy transfers across the Maryland-Pennsylvania boundary over the facilities of the railroad not used for its own use? A. No, there is no reflection in that figure in any way for any flows over the Safe Harbor-Perryville line.

Q. Do the figures in that column include deliveries from Perryville to Conestoga across the Maryland-Pennsylvania boundary? A. They do not.

Q. Why did you exclude those?

THE WITNESS: Because there is no energy flow across that boundary, namely, the state line, which is not used for [18023] the Pennsylvania Railroad directly.

Now, to be sure that we are talking about the same thing we are there talking in that column about the net flows from Perryville to Safe Harbor and I think that the other answer is that there never is a net hourly flow in that direction and if there is the resultant energy is used directly by the Pennsylvania Railroad in Maryland.

I am sorry, Mr. Examiner, on reconsideration of that last answer, it is not responsive, obviously, because we are talking about net hourly flows from Maryland to Pennsyl-



vania. I am still of the opinion that there is not experienced any net hourly flows on those lines from Maryland to Pennsylvania but if there are, such energy is used by the Pennsylvania Railroad north of the State Line of Pennsylvania and Conestoga Substation:

**TRIAL EXAMINER:** What lines are you referring to now?

**THE WITNESS:** P-5, P-6, P-7 and P-8 and such energy is received from the Philadelphia Electric Company at Chester via Perryville.

**By MR. WAHRENBROCK:**

**Q.** Let me understand this, Mr. Spaulding: As I understood your testimony the other day—and I think you will remember it clearly, I cannot point to it in the record—but there was a reference to the fact that at times energy from Chester, Pennsylvania would come to Perryville, Maryland, [18024] go up to Safe Harbor, to the Conestoga bus at Safe Harbor, come down over the other two circuits to Perryville again and go on down over the railroad facilities to Benning where it was delivered to PEPCO.

**Do you recall that testimony?** **A.** I do recall it. I do not recall that statement but I recall the testimony where we were discussing the general subject.

**Q.** Yes, now in the event of such a flow of energy there would be a flow from Perryville in Maryland up on two circuits to the Conestoga bus in Pennsylvania, is not that true? **A.** Yes.

**Q.** No such amounts are reflected in your last column or any place else on your Exhibit 354? **A.** No, because there would be an equal amount going down the other circuit and the hourly net would be zero, or at least would not be a negative hourly net representing flow from Perryville to Conestoga.

**Q.** Upon what basis do you assume that the energy which flows from Perryville to the Conestoga bus over one pair of circuits returns to Perryville over another pair?

[18025] THE WITNESS: I do not know what you mean by basis. Do you mean how do I know what happens?

By MR. WAHREN BROCK:

Q. I would be glad to have you explain that. A. I know from the operating records and my knowledge of the operations over those circuits it does happen.

Secondly, it is a very obvious electrical phenomena because if you have power flowing between two points over two paths with different impedance the flow of the current over those two paths will be in proportion to the impedance.

I know there is a considerable amount of energy—a relatively small amount of energy to be sure—but some of the energy that flows around the bypass of Perryville, and for the same reason this power goes up one pair of lines and back on the others, from Perryville to Conestoga and return.

That is something I can see on the meter any day at all. That is how I know it takes place, but perhaps that does not answer your question.

Q. As I understand it, there may be hours when energy originating at Chester reaches Perryville and is transmitted from Perryville up to the Conestoga bus of Safe Harbor in Pennsylvania? A. Frequently.

Q. As I understood your answer a few questions ago, you [18026] did not reflect those amounts which were energy-moving from Perryville in Maryland to the Conestoga bus in Pennsylvania because you said any such flows are offset by corresponding flows in the opposite direction over the other pair of circuits from the Conestoga bus back to Perryville? A. That is correct and I should add that there is usually more energy flowing from Conestoga to Perryville than there is flowing from Perryville to Conestoga.

Q. What I am seeking to ascertain is the basis of your statement that whenever there is such a flow of energy originating at Chester from Perryville to the Conestoga bus

there is always an equal amount or a corresponding amount flowing from the Conestoga bus down to Perryville. A. I know that from my intimate knowledge of the operations over those circuits.

Q. When you say that you mean that there are corresponding amounts but again not necessarily the same electric energy?

. . .

THE WITNESS: There are corresponding amounts, that is correct.

[18027] By MR. WAHRENBROCK:

Q. But those amounts are not necessarily the same electric energy? A. I do not know that and no scientist in the U. S. knows that and I include the most technical scientists there could be. No one knows when energy flows on to a bus and flows off which is the same energy and which is not.

. . .

Q. Mr. Spaulding, directing your attention, if you will to your Exhibit 356 and to your testimony with respect thereto, when you there refer to hours of net Baltimore backfeed, do you again mean the same as you did in using that term with respect to Exhibit 357? A. I am not quite sure. I presume you are referring to page 16,600 and I think the wording there is a little different. I can say, perhaps to save time that the method of determining the net Baltimore backfeed which I used in connection with the preparation of Exhibit 356, was the same procedure and generally the same basic figures that I [18028] used in connection with the preparation of Exhibit 357.

Q. On Exhibit 356, the second column of figures in the first tabulation, the figure for 1944 being the figure of 180,675,000 should the heading of that column be understood as though it read "Kilowatt-hours supplied during Hours of net Baltimore Backfeed"? A. They were the kilowatt-hours supplied during the hours when I found

there was "Net Baltimore Backfeed" in the manner that we just discussed.

Q. And the same thing is true of the fourth heading on the same tabulation, "Kilowatt-hours supplied during hours of no net Baltimore backfeed"? A. That is correct, with the same qualifications.

Q. And the same thing is true for the corresponding headings in the second tabulation on the same exhibit, the third heading and the fifth heading? A. I am sorry, I do not believe I see exactly what headings you are referring to now.

Q. The heading in the second tabulation for the third column of figures should be read in the sense that it means "Revenue received for energy only during hours of net Baltimore Backfeed"? A. I think that is correct.

Q. And the fifth heading "Total revenue received for Electric Services Exclusive of Revenue Received for Energy [18029] only during Hours of Net Baltimore Backfeed"? A. That is correct, using net Baltimore backfeed in the manner that we discussed before the recess.

Q. Refer, if you will, please, to Exhibit 358 and to your testimony with respect thereto; when you speak of hours of net Baltimore backfeed in this exhibit and with respect to this exhibit, do you use that term with the same meaning as that to which you previously testified?

. . .

THE WITNESS: I do not think I should answer this one categorically and I will try to answer it as direct as possible.

So far as the determination of the hours during which the amount of net Baltimore backfeed is concerned, I used the same basic figures in connection with Exhibit 358 that I did in connection with Exhibits 356 and 357.

However, in determining the use of such "Net Baltimore Backfeed" I have considered its first use in connection with interchange transactions.



By MR. WAHRENBROCK:

Q. And then do I understand that the hours of net Baltimore backfeed referred to in the heading of Exhibit 358 are not the identical hours as the hours of net Baltimore backfeed referred to in the heading to Exhibit 356? [18030] A. No, they are not the same hours nor are they the same hours in connection with Exhibit 357.

The same basic data was used in each, the same method of approach was used in each but they do not represent the same hours and, of course, they do not represent the same use of energy in connection with the several services.

Q. Let me understand you. With respect to Exhibit 358 by "Hours of Net Baltimore Backfeed" as used in this exhibit, do you mean hours in which there was a net supply of energy over the 220 kv circuits from Baltimore to Safe Harbor after deducting the amount flowing in the opposite direction over the 66 kv circuits from Holtwood to Highlandtown, is that correct?

. . .

THE WITNESS: May I put it a little differently and see if I can answer it specifically. If there was backfeed over the 66 kv, 25 cycle circuits that would be added to any backfeed over the 220 kv circuits; if there was a delivery from Holtwood to Highlandtown at the time there was backfeed over the 220 kv circuits then the net effect was first considered and then that was reduced by the supply, if any, from Conestoga substation to the Pennsylvania Railroad at Perryville and Conowingo for the railroad's own use, other than what was delivered at Benning.

[18031] By MR. WAHRENBROCK:

Q. For the Railroad's own use in Maryland? A. That is correct. The net of those three figures then determined the amount of net Baltimore backfeed in that hour.

Q. And you chose only such hours as did show such a net flow towards Safe Harbor; is that correct? A. That is correct.

Q. Aren't those the same hours that you used on Exhibit 357 as hours of net Baltimore backfeed? A. They are the same basic hours but there may or may not have been interchange during those hours.

Q. But those are the same hours of net Baltimore backfeed? A. That is correct.

Q. And those are the same hours of net Baltimore backfeed as you used on Exhibit 356? A. That is correct.

Q. In each case the hours of net Baltimore backfeed means the same thing but you have used in the one case—that is to say, you have used in the case of Exhibit 356—you have shown kilowatt-hours supplied to Pennsylvania firm customers during such hours of net Baltimore backfeed whereas in Exhibit 358 you have used interchange supplied to Pennsylvania customers during such hours of net Baltimore [18032] backfeed, is that correct? A. That is correct. There would always be amounts of firm power services delivered, for example, to the Coatesville Division of Philadelphia Electric Company and therefore I gave consideration in Exhibit 356 to all of the hours in which there was "Net Baltimore backfeed".

But in Exhibit 358 I only gave consideration to those hours in which there was interchange supplied by Penn Water and Safe Harbor to their Pennsylvania customers and that did not occur in every hour in which there was backfeed. That is the distinction I was trying to make.

Q. Yes. A. So that we do not use necessarily the same hours in each instance although the same basic hours are first considered.

Q. Then on Exhibit 358 where in the headings to particular columns there is a reference to hours of Baltimore backfeed, you mean hours of net Baltimore backfeed? A. That is correct.

Q. And where there is a reference to hours of no Baltimore backfeed you mean hours of no net Baltimore backfeed? A. That is correct.

Q. Within the meaning of the term "net Baltimore backfeed" that you have just described? A. That is correct, that I have just described in [18033] connection with these three exhibits, 356, 357 and 358.

Q. Now, in these Exhibits 356, 357 and 358—let me withdraw that for the moment. Is the same thing true of your use of the term "net Baltimore Backfeed" in Exhibit 359? A. The same basic figures, the same basic hours were first determined and used in connection with Exhibit 359 as we used in connection with Exhibits 356, 357 and 358.

Q. In Exhibit 369 does "Annual backfeed energy supplied by Baltimore Company," similarly mean net Baltimore backfeed?

. . .

THE WITNESS: That cannot be answered categorically because there are several figures shown in Exhibit 369. The amounts shown in the first column are determined in the same way and were from the same basic data as was used with reference to the last few exhibits we have been talking about, but the amount shown in the second column was not so determined.

By MR. WAHRENBROCK:

Q. Kilowatt hours received on hourly net basis there refers to net Baltimore backfeed as you have described your computation of net Baltimore backfeed in your previous testimony? A. Which we have just been referring to, yes.

Q. In these Exhibits 356, 357, 358, 359 and 369 you have netted energy as you have just described irrespective [18034] of whether it was supplied at 60-cycle, 3 phase or 25-cycle 3 phase, or 25-cycle single phase and irrespective of differences in voltage? A. That is correct, in the manner that I have described.

Q. In your Exhibits 356, 357 and 358 if instead of netting against the amounts of energy supplied to Safe Harbor over the 220 kv circuits, any flows in the opposite direc-

tion over the 66 kv circuits and deliveries for Maryland use by the railroad, you had used the flows on the 220 kv circuits without any deductions, would you have obtained a larger number of hours of Baltimore backfeed? A. I think that would be the tendency. I do not know what effect there would be.

Q. Would there also have been a tendency to substantially increase the amounts of such Baltimore backfeed in each hour? A. I would not agree it was substantial; I would agree that was the direction.

Q. Did you attempt to ascertain what that effect would be, the amount of it? A. I did not determine what the amount would be.

Q. Did you attempt to ascertain what the effect would be on the number of hours? A. I did not attempt to do that. I only know from my general knowledge that it would be in that direction.

Q. Directing your attention to Exhibit 359, if instead [18035] of using net Baltimore backfeed as you have explained your usage of that term you had used Baltimore backfeed without deducting flows toward Highlandtown and Maryland use of energy by the Pennsylvania Railroad, would the percentage figures in column three have been larger?

MR. MYSE: Mr. Examiner, we have just gone over that. The witness said yes, it would be in that direction, but he has not made any specific study of it. Why do we have to go all over it chapter and verse again?

TRIAL EXAMINER: Is that the thing you had in mind, Mr. Witness, when you gave your previous answer, it would have that same effect on this place?

THE WITNESS: I think so but I should like to check this particular exhibit to be sure. My difficulty is that here he is asking about percentage figures and percentage figures could be misleading. If you are talking about kilowatt-hour figures my answer would be correct.

Question, please.



(Question read.)

THE WITNESS: That would have been the tendency.

By MR. WAHRENBROCK:

Q. In your testimony before the afternoon recess today and shortly after the noon recess you testified with respect to what the figure would have been without the deduction of the flows over the 66 kv circuit and for Maryland use by [18036] the railroad which, as I believe in the case of the year 1946 you said would have been 157,809,000 kilowatt hours instead of the 99,439,000 kilowatt hours shown for 1946 in the first column of Exhibit 369. Would the difference between the 157 million and the 99 million figure be made up of the additional hours and the increase within the hours to which I have previously referred?

. . .

MR. MYSE: Which hours are you now talking about?

THE WITNESS: I do not think the number of hours has any bearing on the difference but they are the differences between the net hour delivery on the 220 kv circuits alone and the net hourly delivery on the basis that we have been referring to as net Baltimore backfeed.

By MR. WAHRENBROCK:

Q. If, as you have testified, the use of the deliveries to Safe Harbor over the 220 kv circuits without deduction for the amounts in the opposite direction over the 66 kv circuits and the Maryland consumption by the railroad would tend to increase the number of hours of Baltimore backfeed and tend to increase the amount of hours, those two tendencies would be reflected in the difference between the figure of 99 million and the figure of 157 million to which I previously referred? [18037] A. That is correct.

Q. Mr. Spaulding, as a matter of fact, were there hours in which Penn Water received interchange from Philadelphia Electric and during the same hour delivered interchange to Pennsylvania Power and Light or Met. Edison

or both of them, and during the same hour received what you have defined as net Baltimore backfeed?

. . .

**THE WITNESS:** I do not know and my difficulty comes from your inquiry about the interchange with the Philadelphia Electric because that is the thing that I am not in a position to answer.

**By MR. WAHRENBLOCK:**

**Q.** That is, you did not ascertain whether hours of net Baltimore backfeed during which Penn Water was delivering to Pennsylvania Power and Light or Met. Edison were hours in which there were also receipts of interchange from Philadelphia Electric? **A.** I would not be interested in that because the amounts of receipts from the Philadelphia Electric are used by the railroad.

**TRIAL EXAMINER:** What is that?

**THE WITNESS:** The amount of receipts from the Philadelphia Electric Company—and I, of course, understand the [18038] way in which he uses that expression—is, in fact, all used by the railroad.

**TRIAL EXAMINER:** That would be over P-5 and P-6?

**THE WITNESS:** It would be either at Thorndale or Perryville, Mr. Examiner. His question is more general than the one we had before.

**By MR. WAHRENBLOCK:**

**Q.** Then do I understand that you treated any such energy as not being received because it was energy which was actually used by the railroad, not because of any priority which you assigned to it? **A.** Which exhibit are we talking about now?

**Q.** All of these three in which we have used net Baltimore backfeed, that is to say, 356, 357, and 358.

**MR. MYSE:** Mr. Examiner, I have been listening very patiently and I pride myself in being able—at

least I think I know something about the flows of energy but this last question stumps me. I do not see how it has any connection whatsoever with any of the exhibits or the direct testimony up to this point.

**TRIAL EXAMINER:** The witness may answer.

**THE WITNESS:** The amounts received by the railroad and metered at Perryville and Thorndale as being used by the [18039] railroad west of Thorndale and south of Perryville, did not affect in any way my determinations on Exhibits 356, 357, 358 and 359.

**TRIAL EXAMINER:** The question asked why.

**THE WITNESS:** I do not understand that question, Mr. Examiner, I merely state that it did not affect the answer. It did not influence what I did, I used it in no way. I do not know what your next question is.

**By MR. WAHRENBROCK:**

**Q.** Well, if there was such energy you treated that on the basis of the use actually made of the specific energy; is that true?

**MR. MYSE:** Same objection.

**TRIAL EXAMINER:** He may answer.

**THE WITNESS:** I knew that it was used by the Pennsylvania Railroad and was not used for anything else. I am sorry, I do not believe I understand the question beyond that point.

**By MR. WAHRENBROCK:**

**Q.** I think that answers it, if I understand the answer right, that is, that the fact that energy was actually used by the railroad determined that you would exclude that from your consideration? **A.** No, I did not have to use it, there was no occasion to use it at all. That is the reason I have difficulty. There is no relation between this ques-

tion and all the questions [18040] we have been talking about for the last two hours.

Q. And the reason you did not have to use it was because that energy you regarded as actually used by the railroad? A. No, it is because I had no occasion to use that energy at all in connection with my determination. It was not of any interest to me in making my determination, any more so than the amount of energy that was sold in the City of Chicago in the same hour, it just did not have any relation.

Q. I think maybe I can ascertain what I have been seeking to ascertain by asking you this: In connection with your testimony earlier today you said that in allocating the net Baltimore backfeed you treated it as being utilized first to supply the interchange requirements of the other Pennsylvania customers, meaning other than the Pennsylvania Railroad.

Do you recall that? A. Yes.

Q. Now, if during such an hour when there was net Baltimore backfeed and interchange requirements of the other Pennsylvania customers were being supplied and you applied the net Baltimore backfeed to those requirements, those interchange requirements of the other Pennsylvania customers, you did not deem it necessary to give any consideration to the receipt of interchange energy from Philadelphia Electric during any such hour as it may have occurred? [18041] A. I do not think it would occur. It would be very, very abnormal to receive energy over the railroad circuits and send it out somewhere else. It may happen once in a great while but then I do not believe we had backfeed from Baltimore. You are getting a lot of probabilities there and I do not think that has any relation.

Q. All right—

THE WITNESS: May I have the first part of your inquiry read?

(Question read.)



**THE WITNESS:** I went back to get the first sentence in your statement because we have been talking about two determinations here today, one represented by Exhibit 354 and the other by Exhibits 356 and 357, 358 and so on.

Therefore, in order to be responsive I must know when during the day we were talking about this Baltimore back-feed.

Was it in connection with Exhibit 354?

**MR. WAHRENBROCK:** In connection with Exhibit 354, yes.

**MR. MYSE:** Now, may I have the question, please.

**TRIAL EXAMINER:** Yes.

**THE REPORTER:** There is no question pending.

**MR. MYSE:** I withdraw my request.

**MR. WAHRENBROCK:** I withdraw my statement, too. You are right in asking which of these it is, and I mean to say [18042] 357.

. . .

**THE WITNESS:** In other words, I do not believe we were receiving energy as interchange from the Philadelphia Electric which was being consumed by the railroad at the time we are sending out interchange over the 60-cycle tie.

**By MR. WAHRENBROCK:**

**Q.** During hours of net Baltimore backfeed when interchange requirements for the other Pennsylvania customers were treated by you as being first supplied with such net Baltimore backfeed, did you give any effect to the fact that interchange energy was being received from any of the other Pennsylvania customers during the same hour?

. . .

**THE WITNESS:** No, that would become circulating power that we talked about the other day. If it was coming in over one sixty cycle tie and going out over the other it is

treated as circulating power and is not considered as interchange at all under any circumstances.

TRIAL EXAMINER: Counsel referred to Exhibit 357, was that 357 or 358?

[18043] MR. WAHRENBROCK: I was referring to 357. I do not believe it would make any difference, if the Examiner has 358 in mind.

TRIAL EXAMINER: 357 is the firm, is it not?

MR. WAHRENBROCK: I was referring to 357.

THE WITNESS: In principle it would not make any difference; in detail, of course, it would.

MR. WAHRENBROCK: Let me carry the last question just one step further if I may.

By MR. WAHRENBROCK:

Q. Assume an hour of net Baltimore backfeed in which electric energy is being supplied to Pennsylvania Power and Light under interchange agreements and is being received from Met. Edison under interchange agreements, in such an hour did you in deducting from the Baltimore backfeed or in allocating the Baltimore backfeed first to the interchange requirements, did you give any effect to the receipt of energy—interchange energy from Met. Edison? A. No, because in that instance assuming that the amount delivered to P. P. & L. as interchange was the same as the amount received from ME Company as interchange, would not be considered an interchange transaction but would be considered circulating flow which we discussed a couple of days ago. That is not considered an interchange transaction and there is no accounting for it as such.

[18044] Q. If the amounts were not equal what effect, if any, did you give? A. If the amounts were not equal and it was a delivery of interchange services then of course we considered that first in determining how the Baltimore

backfeed was to be used or in what connection it was to be used. If it was a receipt then obviously it was a receipt and there was no adjustment to the Baltimore backfeed.

Then you go back to the question as to what you next consider it was used for. If the net was a receipt then obviously none of Baltimore's backfeed was considered in connection with interchange in connection with Exhibit 358.

Q. To take specific figures, suppose during a particular hour the net Baltimore backfeed as you have treated it was 20 and the interchange supplied to P. P. & L. was 10 and the interchange received from Met. Edison was 5, how much [18045] did you treat of the 20 Baltimore backfeed as going to interchange with other Pennsylvania customers before determining how much you allotted to other purposes? A. Well, the assumptions you made would result in an interchange transaction of 5,000 or five units—I assume you mean 5,000 kwh—and presumably that would be a transaction with P. P. & L.

The difference between the 10,000 to P. P. & L. and the 5,000 from M. E. Company being circulating, therefore I would assign 5,000 of the net backfeed as being used in connection with interchange services and 15,000 for some other purpose.

Q. That helps me to understand it. Now, just to see what you did in the other type of situation, reverse the Pennsylvania Power and Light and the Met. Edison figures—I am sorry, I do not mean reverse them. I mean 5,000 was delivered to Pennsylvania Power and Light and 10,000 was received from Met. Edison. Now, in such a circumstance did you apply any of the net Baltimore backfeed to interchange requirements ahead of the other uses to which you allocated it? A. I did not because there were no interchange deliveries in that hour. The net interchange transaction was 5,000 received by Pennsylvania Water at Safe Harbor and Holtwood.

[18049] Q. \* \* \* As I understood your use of the term "net Baltimore backfeed," as you described it it was the amount transmitted from Maryland to Safe Harbor over the 220 kv. circuits less the amount in the same hour, if any, transmitted from Holtwood to Highlandtown over the 66 kv. circuits. Is that correct and is that the method by which you actually determined those amounts, or did you also deduct the amount, if any, supplied to the railroad facilities over and above the amount used by the railroad for its own use?

[18050] MR. WAHRENBROCK: May I strike the last part of the question, please, beginning "or"? I will end my question at that point, Mr. Examiner.

THE WITNESS: That is neither correct nor the method I used.

By MR. WAHRENBROCK:

Q. I think it is a good thing, then, that I asked because that was my understanding. Will you explain, then?

[18051] THE WITNESS: In any hour I determined the amount of "net Baltimore backfeed" by first determining the net hourly amounts of energy transmitted from Maryland to Safe Harbor over the 220 kv. lines, and if such net amount was representative of a net flow from Maryland to Pennsylvania I then deducted from such net amount the net amount, if any, of the flow from Holtwood to Highlandtown over the 66 kv. 25 cycle circuits, and further deducted such amounts, if any, which were consumed by the Pennsylvania Railroad in Maryland in excess of the net hourly amounts, if any, which may have been supplied to the railroad from the Benning frequency changer.

By MR. WAHRENBROCK:

Q. Thank you, Mr. Spaulding. That answers directly what I was seeking to get at. I believe if your attention



were directed to it you would want to say that in deducting the amount transmitted from Holtwood to Highlandtown, deducting the net amount transmitted from Holtwood to Highlandtown, you meant to say deducting the net hourly amount? A. That is what I did in fact, deduct the net hourly [18052] amount of the energy, if any, delivered at Highlandtown being transmitted from Holtwood.

Q. And the amounts which you deducted representing amounts consumed by the Pennsylvania Railroad in Maryland in excess of amounts supplied to the Pennsylvania Railroad from the Benning frequency changer were also net hourly amounts? A. I considered the net hourly amounts of the supply, if any, to the railroad from Benning. Obviously the amount consumed by the railroad is not a net amount.

TRIAL EXAMINER: That net hourly is figured on the basis of both of the 220 kv. lines, is that right?

THE WITNESS: Yes.

TRIAL EXAMINER: One from Westport and the other Riverside?

THE WITNESS: Yes.

[18053] By MR. WAHRENBROCK:

Q. Mr. Spaulding, in computing the kilowatt-hours of net Baltimore backfeed used in connection with the electric services supplied to Pennsylvania firm customers as shown in your Exhibit 357, will you illustrate your method of computation by taking the following hypothetical hour: namely, one in which the net Baltimore backfeed, as you have just explained that term, is 50,000 kilowatt-hours. The interchange requirements of the Pennsylvania customers, other than the Pennsylvania Railroad, are 10,000 kilowatt-hours.

The Pennsylvania Railroad consumes in Maryland, exclusive of the amounts supplied to it through the Benning frequency changer, 25,000, and upon those facts, how did you determine the number of kilowatt-hours used in con-

nection with electric services supplied to Pennsylvania firm customers, out of the net Baltimore backfeed? A. May I make two comments before I answer?

Q. Yes. A. You referred to interchange requirements. I do not agree they are requirements. They are interchange transactions.

Q. I will be glad to accept that statement. A. Secondly, I thought it was evident from my last answer that the amount of 25,000 kwh. used by the Railroad for its own use in Maryland less any amount which may have been supplied from Benning had already been considered and accounted for in [18054] connection with the determination of the net Baltimore backfeed of 50,000 kilowatt-hours which you first used in your assumption.

My answer to your question, therefore, would be that 40,000 kilowatt-hours would have been considered by me as being used in connection with electric services supplied to the Pennsylvania firm customers under your assumption.

Q. And in arriving at the figures which appear on Exhibit 357 the method which you have just explained for such hours was followed by you; where such hours occurred, I mean. A. No, because you have not indicated in your assumption what the requirements of the Pennsylvania Railroad were in the State of Pennsylvania for its own use, and the figure of 40,000 kilowatt-hours which I gave you might have been used in whole or in part in supplying the Pennsylvania Railroad requirements in Pennsylvania before I would have considered it available for use in connection with electric services supplied to Pennsylvania firm power customers exclusive of Pennsylvania Railroad, as shown on the heading of Exhibit 357.

Q. Then the method which you described with respect to the hypothetical hour I gave was used, and in addition you deducted the requirements of the Pennsylvania Railroad in Pennsylvania? A. I did so in arriving at the amount shown in Exhibit 357; as will be indicated by the title.

[18055] Q. Will you explain how, for that purpose, you determined the Pennsylvania Railroad requirements in Pennsylvania? A. They are known to me hourly from meter records.

Q. Which meter records, on which circuits? A. I have to give consideration to the meters at Thorndale, Pennsylvania; certain of the meters at Perryville, Maryland; the meters at Fishing Creek, and certain meters at Conestoga substation.

[18058] Q. In an hour in which there was transmitted over the 220 kv. circuits to Safe Harbor, 50,000 kilowatt-hours net amount and there was transmitted over the 25-cycle lines from Holtwood to Highlandtown a net amount of 25,000 kilowatt-hours, and there was supplied to the Railroad for consumption in Maryland, exclusive of the amount supplied to the Railroad at Benning, a net amount of 25,000 kilowatt-hours, you treated the net Baltimore backfeed as being zero for that hour. Is that correct? [18059] A. I so considered it.

Q. Did you consider that the amount of energy supplied to the Baltimore Company for that hour was zero? A. For what purpose?

Q. For the purposes of interchange accounting under the contracts. A. I am afraid you will have to be a little more specific, Mr. Wahrenbrock.

MR. MYSE: Mr. Wahrenbrock, do you mind if I furnish the witness with Exhibits 18 and 19, and also 20?

MR. WAHRENBROCK: No, indeed.

THE WITNESS: Is there a question pending?

By MR. WAHRENBROCK:

Q. You have made a comment. I would like to ask you whether, in the light of those exhibits which have been handed you, you are now able to answer the question. A. May I have the original question?

(Question read.)

**THE WITNESS:** For the purpose of determining Holtwood Company's firm power bill to Baltimore Company for the years 1944, '45, '46, such firm power bills being shown for the year 1944 and 1945 in Exhibit 19 and for the year 1946 in Exhibit 379, Schedule D, the interchange accounting with Baltimore Company was determined in that manner.

By MR. WAHRENBROCK:

[18060] Q. Thank you.

**TRIAL EXAMINER:** To what manner do you refer?

**THE WITNESS:** In the manner just described in the preceding question.

**TRIAL EXAMINER:** Will you indicate more specifically what that is?

**THE WITNESS:** The amount of net Baltimore backfeed which we have been discussing this morning was determined, as I stated in the second or third answer in this morning's record and that was the method used in determining the interchange accounting shown and used in connection with the Holtwood firm power bills I have just described.

**TRIAL EXAMINER:** The question was whether, on the basis of the hypothetical figures, the interchange accounting would not come out zero.

**THE WITNESS:** And I agreed that it would. He then asked me if that method was the method used.

**TRIAL EXAMINER:** I didn't hear that.

**THE WITNESS:** As represented by the several examples he gave me.

Let me state again, Mr. Examiner—

**TRIAL EXAMINER:** Offset against the 50,000 net over the 220 kv. circuits to Safe Harbor, the 25,000 running over the 66 kv. at 25-cycles and the 25,000 to the railroad for use in Maryland?



[18061] THE WITNESS: With the understanding that no part of that 25,000 was supplied to the Railroad from Benning.

By MR. WAHRENBRUCK:

Q. Referring to transcript 16,607, the first line and the 51 per cent figure, it appears from the work sheets which you have supplied to us, and particularly the work sheet which has the heading, "Generation by Penn Water and Safe Harbor and Distribution Between Maryland and Pennsylvania in Megawatt-Hours", that for 1946 you derived a percentage figure of 51.7 by a method which includes the consideration of an amount of 126,095 megawatt-hours designated as "132 kv., Perryville and Conowingo, net hourly delivery."

Do you recognize that figure, and will you explain how it was computed? A. Yes, I will. The amounts shown on the work sheet are the actual amounts supplied to the Pennsylvania Railroad at Conowingo and Perryville. Such actual supplies are taken on a net hourly basis and accumulated and shown on the work sheets as amounting to 126,095 megawatt-hours for the year 1946.

Q. In computing that figure did you make any deductions for amounts at other points, such as Fishing Creek?

A. I don't know what you mean by "deductions." It states it is the amount delivered at Perryville and Conowingo. Obviously it does not include the amounts at Fishing Creek.

Q. Is any of the amount included in the 126,095 based [18062] on meter readings at Perryville? A. In part.

Q. The part being the Philadelphia Electric interchange? A. No.

Q. What part? A. Being the amount supplied to the Railroad section in Maryland through the by-pass meter known as the BB meter.

Q. That is the only part of this 126,095 based on meter readings at Perryville. Is that right? A. Yes.

Q. All the other meter readings are of meters located at Conestoga? A. Well, we are right back into the com-

plications of the meters. I will have to explain it here so we won't get confused.

Under the Railroad contract identified as Exhibit 10, electric companies—and I am there referring to Penn Water, Safe Harbor, and Baltimore Company—agree to provide meters at Perryville on the 132 kv. high-tension lines. However, those meters would have cost, as I recall it, something like 75 or 100 thousand dollars, and it was determined that meters could be installed at Conestoga substation on those circuits with special compensating windings which were referred to as “loss meters” which, in effect, looked down over the lines and measured the quantities at Perryville in both directions.

Therefore, although the actual kilowatt-hour meters are [18063] not at Perryville, they do meter the amounts at Perryville and were provided for a few thousand dollars instead of \$100,000.

Q. The figure of 126,095 is a net figure based upon readings of the by-pass meters actually located at Perryville and these “loss meters” physically located at Conestoga but reading as though located at Perryville, to which you have just referred, and not others. Is that correct?  
A. No. Let me explain that again.

You have kilowatt-hour meters on each transformer at Conestoga substation connected to the lines going to Perryville.

I am here concerned only with those meters on lines P-7 and P-8. In addition to those kilowatt-hour meters there are compensating meters known as “loss meters”. By reading the kwh. meters and either adding or subtracting the “losses” as metered, it is possible to determine the amounts on the circuit at Perryville. However, consideration must be also given for the amounts tapped from circuits P-7 and P-8 at Safe Harbor and at Fishing Creek and proper adjustments made for those amounts so taken off.

It is because of these complications that I recognize it would take so long to explain the other question you asked

me about the meters used in determining the supply to the Railroad in Maryland and Pennsylvania, respectively.

[18064] TRIAL EXAMINER: How does the by-pass meter work?

THE WITNESS: The by-pass meter, Mr. Examiner, is in the bus tie breaker at the distribution substation of the railroad at Perryville, being a 12,000 volt bus. One section of that bus is supplied through transformers with the 132 kv. circuits running from Safe Harbor via Perryville to Benning and the other section of that low tension bus is supplied by transformers connected to the 132 kv. circuits extending from Safe Harbor via Perryville to the Lamokin Substation of the Railroad near Chester, Pennsylvania. There is a certain amount of power flow between the 132 kv. circuits north and those south, and that is metered at the time it flows across the bus tie breaker in the Perryville Substation. That is known as the BB meter.

By MR. WAHRENBROCK:—

Q. Then do I understand that this figure of 126,095 is based upon the readings of the by-pass meters at Perryville, the meters on circuits P-7 and P-8 physically located at the Conestoga Substation, with adjustments based upon the readings of the so-called "Loss meters" physically located at the Conestoga Substation, and with deductions for amounts supplied [18065] from the P-7 and P-8 circuits to Safe Harbor and to Fishing Creek? A. At Safe Harbor and Fishing Creek, yes. The Railroad has distribution substations at Safe Harbor and Fishing Creek that are supplied from these circuits and adjustment has to be made for the amount so supplied.

Q. The deductions, then, are of amounts supplied from the P-7 and P-8 circuits at Safe Harbor and at Fishing Creek? A. That is correct.

Q. With that amendment my statement is correct? A. That is correct.

TRIAL EXAMINER: What becomes of the amounts taken off there? Are they used by the railroad?

THE WITNESS: They are used by the railroad on their trolley circuits for the operation of electric trains along the C&PD freight division of the railroad.

[18088] Q. So that Exhibit 42 reflects whatever supply of energy there may have been from the house units on to the main bus at Safe Harbor during the hours covered by that exhibit? A. That is correct.

[18260]

EDWARD L. DUNN.

RE-CROSS-EXAMINATION (Continued).

By MR. HULL:

[18262] Q. You have in your exhibits and testimony considered five per cent as a reasonable rate of return to be allowed to the Respondent company for the immediate future, have you not?

THE WITNESS: I have made no study of what is a reasonable rate of return for Pennsylvania Water & Power Company and the fact that I selected five per cent is merely for illustrative purposes.

[18318]

GEORGE W. SPAULDING.

CROSS-EXAMINATION (Resumed).

By MR. GOLDBERG:

[18322] Q. Now, then, Mr. Spaulding, directing your attention to 189.9 million kilowatt hours appearing in line 4



schedule 3-a [18323] of Exhibit 378, would you please describe for us your derivation of that figure? A. That figure is the sum of two groups of items, namely, first the sum of the kilowatt hours supplied as interchange by Penn Water and Safe Harbor to their Pennsylvania customers that did not involve any net hourly backfeed from Baltimore.

Secondly, it includes the sum of the kwh supplied by Penn Water and Safe Harbor to their Pennsylvania customers that was supplied during the time that "Net Baltimore Backfeed was being received from Maryland."

Q. So that relating your answer to your exhibits, Exhibit 359 shows 23,019,000 kilowatt hours used for interchange. Therefore the balance of the 189 million kilowatt hours being the difference between 189.9 million kilowatt hours and the 23,019,000 comes from diverted energy; is that right? A. I think that is correct.

\* \* \*

TRIAL EXAMINER: What do you mean by "Diverted Energy"?

THE WITNESS: I am glad you asked me that, Mr. Examiner. That is a term I have coined here, and I should like to explain it in order that there may be no misunderstanding. It is the [18324] amount of energy that would have been delivered to Baltimore Company and Washington Company except that it was more economical to supply that energy to the Pennsylvania customers and for Baltimore or Washington Company to increase their own generation. It was called diverted energy merely for the purpose of distinguishing it from the amount of backfeed itself.

By MR. GOLDBERG:

Q. Does my memory serve me right? I have a recollection that the company speaks of diverted energy in its FPC form 12 report; is that right? A. I am not sure whether they do or not. I am not familiar with that use,

although if you show it to me, it might recall my memory.

Q. I am just looking here to see—yes, I think that this probably refers to the same thing. If it does not I wish you would tell me.

I show you the 1944 Power System Statement, FPC form 12 filed by Pennsylvania Water and Power Company covering the Holtwood-Safe Harbor system, and I direct your attention to Schedule 8 and the notes to Schedule 8, Column 4, lines 11 to 22, inclusive, and there reference is made, is it not, to the diversion of energy which is delivered by Penn Water over its northern interconnections to others whenever interchange transactions are practicable and economically justified; that is, whenever the cost of increased generation at the [18325] steam plants on Consolidated or PEPCO systems is lower than the cost of power generation in other plants in the interconnected systems? A. The term is used in the same way as it was used in that issue of form 12.

Q. That is what I thought.

In speaking of this diverted energy, do you make any distinction or attempt to determine whether it is Holtwood's entitlement or Baltimore's entitlement which is diverted? A. I do not know what you mean by "entitlement" in that connection.

Q. Well, I will try to be more specific. Under Items E, F and G, for example, there are two-thirds entitlement and one-third entitlement to Consolidated and Holtwood respectively of Safe Harbor's output.

Now, then, when you speak of this diverted energy, do you attempt to make any identification of the diverted energy in relation to entitlements, that is, whether it is Baltimore's entitlement that is diverted or Penn Water's? A. No, I make no attempt to distinguish between them. I was not interested in that because I am treating both companies together here.

[18341] Q. It is the fact, is it not, that a considerable amount of the backfeed is transmitted to Pennsylvania during daylight hours? A. No, it is not a fact. When you say "considerable amount" that is such an ambiguous statement. In my opinion there are relatively small amounts of energy received from Baltimore and use in connection with firm supply in Pennsylvania during the daylight hours. There are at times considerable amounts of backfeed received and used in connection with interchange transactions but I would not agree that there was any amount of energy received and used in connection with firm power services in the daytime hours unless by daytime you mean Saturdays, Sundays and holidays, or after the peak in the evening while the sun is still shining. I do not think of those as daytime hours.

. . .

[18342] Q. If you have 50 going to Highlandtown and 50 going back in the other direction over the 220 kv lines, you cancelled out one against the other in arriving at your 80 million kilowatt hours, is not that so? A. For the purpose of this cost-of-service study I did that; yes, sir.

Q. So that it is a fact, is it not, that the actual [18343] physical deliveries of backfeed to Pennsylvania used in connection with firm supply at Pennsylvania would be greater than the amount shown in line 3 of schedule 4-a? A. That is correct, because I have considered all the generating sources as a group for the purpose of this cost-of-service study; I could not do otherwise for this purpose.

. . .

Q. If I understood one of your answers in connection with line 3, Schedule 4-a of Exhibit 378, it was this, was it not, that the backfeed is supplied by Baltimore Company as it is, so that Baltimore Company can receive, as you put it, energy which is more valuable to it at other times? A. That is correct.

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Q. Doesn't that apply as well to the Pennsylvania customers? A. I am sorry, I do not understand your question. Doesn't what apply as well?

Q. The use of the backfeed makes the Safe Harbor-Holtwood energy output more valuable to the Pennsylvania customers [18344] as well? A. No, I would not agree.

Q. Why not? A. I do not see that there is any relation at all. Let me explain what I meant again. Let's assume Baltimore sent back to Penn Water 1 million kilowatt hours in a day during the hours from 9 P. M. to 9 A. M. the following morning, and received from Penn Water and Safe Harbor 1 million kilowatt hours between the hours of 9 A. M. and 9 P. M. the following day.

The net delivery to Baltimore from Penn Water and Safe Harbor is zero but Penn Water and Safe Harbor have delivered energy when its value is high and received energy when its value was very low, so that the net deliveries may be zero but a very valuable service has been rendered.

There is nothing comparable to that in connection with Pennsylvania customers at all.

Q. Is it a fact that the supply of backfeed during off-peak hours enables Penn Water to supply the Pennsylvania customer during on-peak hours? A. No. It enables Penn Water and Safe Harbor to have more service to supply during the on-peak hours to everybody.

Q. Including the Pennsylvania customers? A. That is right, and due to that it is necessary for Penn Water and Safe Harbor to obtain supplemental energy. [18345] It can obtain it from wherever it is most economical to do so. In the year 1946 a portion of that supplemental energy was received from Baltimore.

Q. Now, when the backfeed is the supplemental energy that you have referred to then it does enable Penn Water to supply the Pennsylvania loads during on-peak hours? A. No, it permits Penn Water and Safe Harbor to have more energy to supply Baltimore during the on-peak hours.

Q. When talking about the Pennsylvania customers it